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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/052,890	10/19/2001	Ofar Sneh	2344-738	9801

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EXAMINER

FULLER, ERIC B

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 09/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.		Applicant(s)	
	10/052,890		SNEH, OFER	
	Examiner		Art Unit	
	Eric B Fuller		1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 July 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>(1)</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Information Disclosure Statement

The information disclosure statement filed April 8, 2002 fails to comply with 37 CFR 1.98(a)(3) because it does not include a concise explanation of the relevance, as it is presently understood by the individual designated in 37 CFR 1.56(c) most knowledgeable about the content of the information, of each patent listed that is not in the English language. The Japanese patents have not been considered.

Claim Observations/Interpretations

In claim 6, step (c), "terminates" should be "terminated".

Except for in certain cases where the applicant has defined that a particular step is performed on a surface that has been previously treated with a prior step, no order has been assumed in the claims. Additionally, the applicant uses the phrase that a step is performed "to the surface previously terminated with a halide" (e.g. claim 7). It is not understood if this requires that the surface is terminated with a halide when the step is performed or if this step is performed any time after the substrate has been terminated with a halide. If the second option is the correct interpretation, then in claim 7, there is no difference between steps (c) and (e). This confusion occurs in other claims as well.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

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The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-3 and 8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1, the phrase "for example" renders the claim indefinite because it is unclear whether the limitation following the phrase is part of the claimed invention. See MPEP § 2173.05(d). Specifically, it is unclear if claims 1-3 require that the chlorine terminated substrate surface or if any halogen terminated substrate surface, besides fluorine, will suffice. For examination purposes, it is assumed that any halogen besides fluorine will suffice.

In claim 8, there are two step (d)'s and two step (e)'s. It is unclear if these steps are performed in alternative to each other or if the steps have been mislabeled and are all included. Additionally, the claim reads to repeat step (d) an integral number of times. It is unclear which step (d) this is referring to.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Srinivas et al. (US 6,524,952 B1).

Srinivas teaches a method of forming a metal silicide film by ALD. The hydrogen flow introduced into the reaction chamber (column 8, lines 20-25) reads on providing a hydrated substrate. TiCl_4 is used as the first reactant (column 8, lines 5-6). A silicon precursor that reads on the applicant's precursor is taught as being the second reactant (column 8, lines 46-55). Purging is taught (column 8, line 32). The temperature is kept within the applicants range (column 8, line 13 and 57). The steps are repeated (column 9, lines 20-27). The reference teaches that the process is also applicable for depositing tungsten silicide instead of titanium silicide (column 4, line 25-30). The reference also teaches the importance of sub-chlorites in the process. The reference is silent to teaching that the tungsten precursor is a tungsten halide where the halide is not fluorine. However, because the reference specifically teaches that TiCl_4 is the first reactant for titanium silicide deposition, teaches that tungsten may be deposited instead of titanium, and that sub-chlorites are important to the deposition process, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to use a tungsten chloride as the first reactant in the process taught by Srinivas.

Claims 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Srinivas et al. (US 6,524,952 B1) in view of Wallace et al. (US 5,316,793).

Srinivas is utilized in these claims for teaching the limitations that existed above and are present in these claims. Additionally, Srinivas teaches that additional

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precursors may be used in order to scavenge chlorine between steps, thus enhancing the formation of sub-chlorides. The reference fails to teach flowing atomic hydrogen between the deposition steps. However, Wallace teaches that as a monolayer is formed by ALD, the surface becomes non-reactive. Before depositing the next layer, atomic hydrogen is flowed over the surface in order to scavenge chlorine and make the surface reactive again (column 5, lines 24-50). Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to flow atomic hydrogen between reactants. By doing so, the surface is made reactive again for the next reactant.

Claims 9-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Srinivas et al. (US 6,524,952 B1) in view of Wallace et al. (US 5,316,793), in further view of Kattelus et al. (VTT Electronics - Research Activities in Microelectronics 1998).

Srinivas, in view of Wallace, is utilized in these claims for teaching the limitations that existed above and are present in these claims. The combined references fail to teach forming nanolaminates. However, Kattelus teaches that forming nanolaminates by ALD results in low leakage current with high breakdown strength (chapter 2.2). Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to form nanolaminates in the ALD process taught by Srinivas. By doing so, low leakage current with high breakdown strength is realized.

Conclusion

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The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kim et al. (US 6,270,572 B1) and Kori et al. (US 6,551,929 B1) are both cited as being pertinent to the applicant's disclosure.

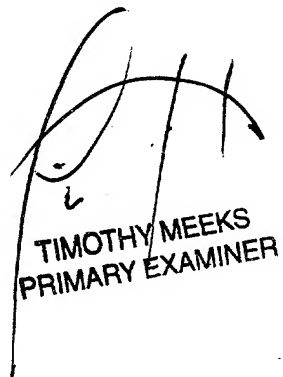
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B Fuller whose telephone number is (703) 308-6544. The examiner can normally be reached on Mondays through Thursdays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck, can be reached at (703) 308-2333. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



EBF



TIMOTHY MEEKS
PRIMARY EXAMINER